



## PRESSURE TESTING OF SAVER SINGLE-PHASE BELLOWS

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### Abstract

Pressure pulse tests were conducted on a Saver single-phase bellows assembly. The test bellows were axially offset one-eighth of an inch from the assembly center to duplicate the maximum tunnel error. The bellows service condition pulses were developed using a helium gas pressure system. No significant permanent deformation was observed in the bellows for pressure pulses with peaks up to 285 psia and plateau times up to 600 milliseconds.

The bellows assembly was pressure pulsed 100 times with peak pressures equal 240 psia and plateau times equal 400 milliseconds. The bellows were determined to be leak tight down to  $2.7 \times 10^{-10}$  cc/sec He after the tests.

### Objectives

To observe the effects of the service condition pressure pulses on the Saver single-phase bellows assembly.

### Conclusions

No significant permanent deformation was observed in the Saver single-phase bellows for pressure pulses with peaks up to 285 psia and plateau times up to 600 milliseconds.

### Discussion

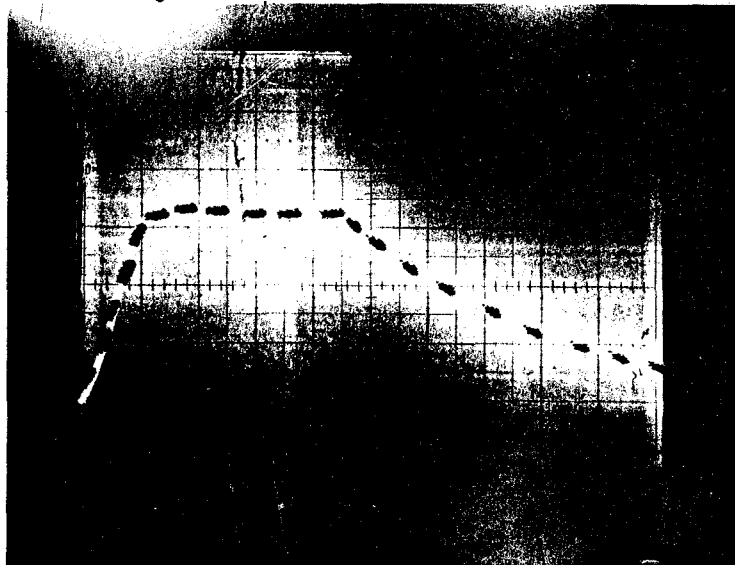
The pressure pulses for each test are shown in Figures 1, 2 and 3. The bellows sections during tests 2 through 7 were videotaped.

The test apparatus is shown in Figure 4. The maximum system pressure was set using the helium gas tank regulator. A variable system capacitance was achieved by injecting helium gas at a measured pressure into the bottom side of the accumulator. The system resistance was varied by setting the exit valve. The pressure transducer was located two inches upstream of the bellows in order to accurately record the pressure pulses that were generated through the bellows. The pulses were generated by opening the activation valve rapidly by hand.

TEST #2

ABSOLUTE  
PRESSURE , PSI

200  
160  
120  
80  
40  
0



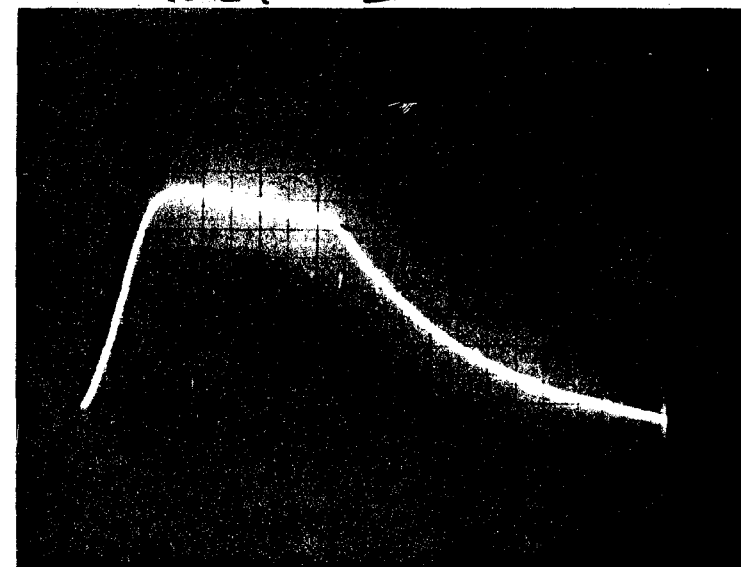
Time →

50 ms/div

TEST #3

ABSOLUTE  
PRESSURE , PSI

200  
160  
120  
80  
40  
0



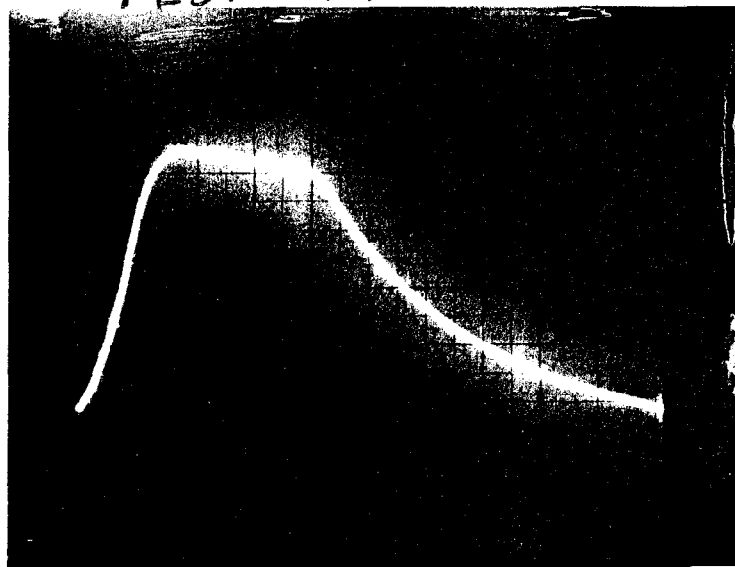
Time →

50 ms/div

TEST #4

ABSOLUTE  
PRESSURE , PSI

200  
160  
120  
80  
40  
0



Time →

50 ms/div

Figure 1.  
Pressure Pulse Traces

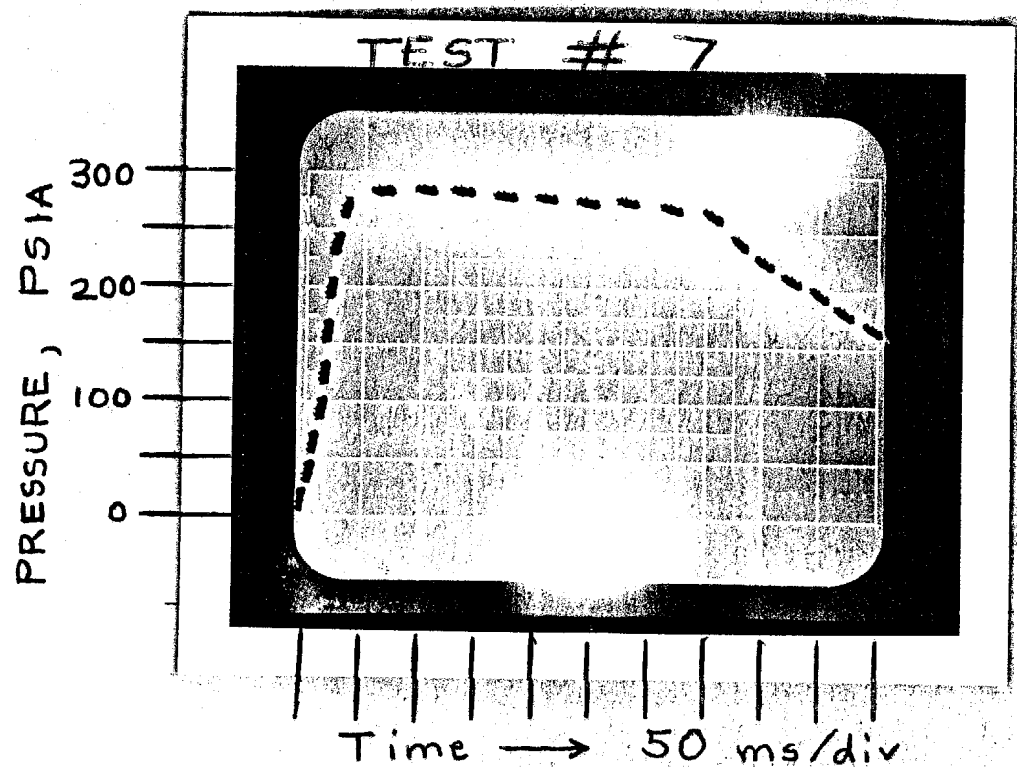
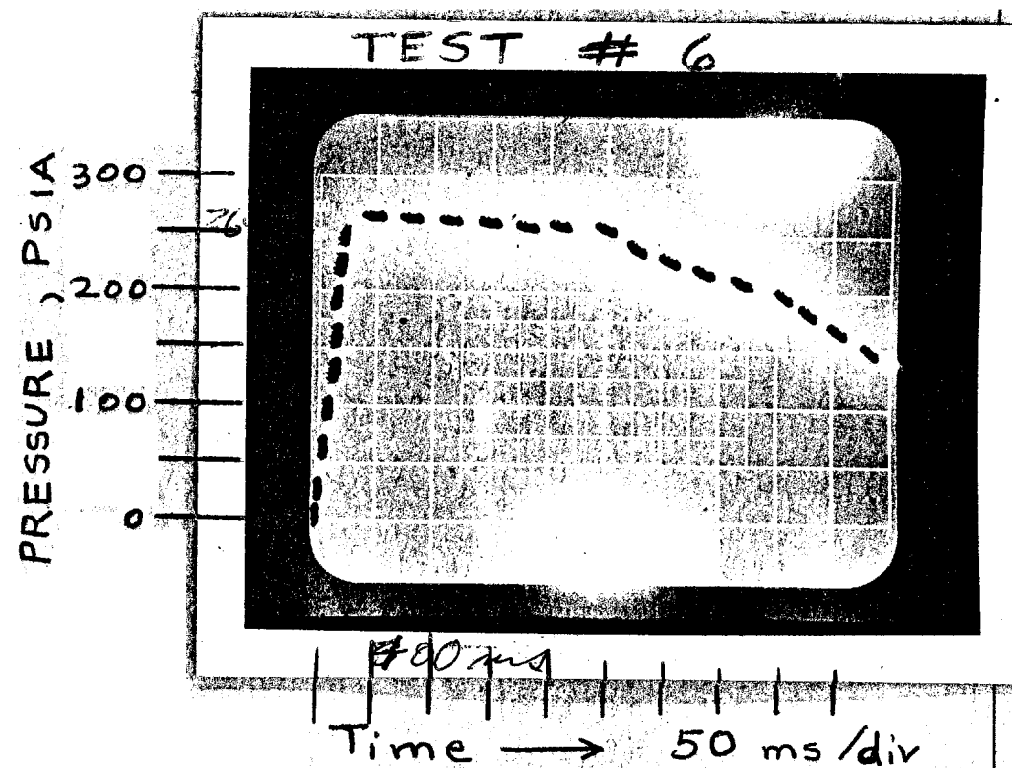
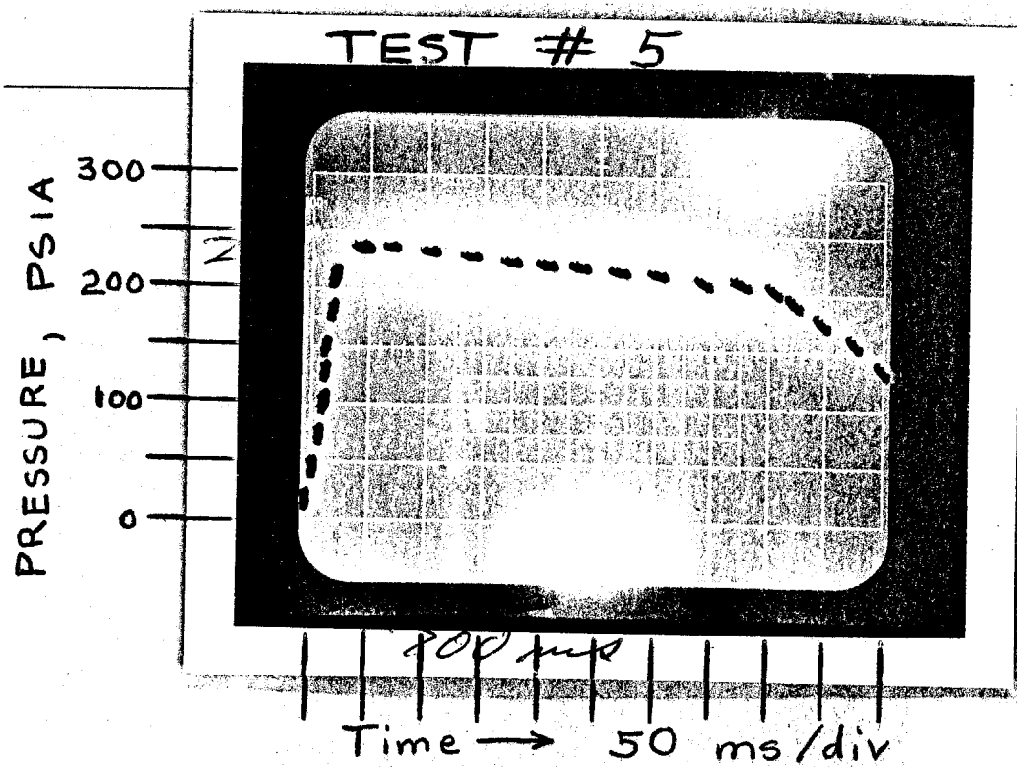


Figure 2.

Pressure Pulse Traces

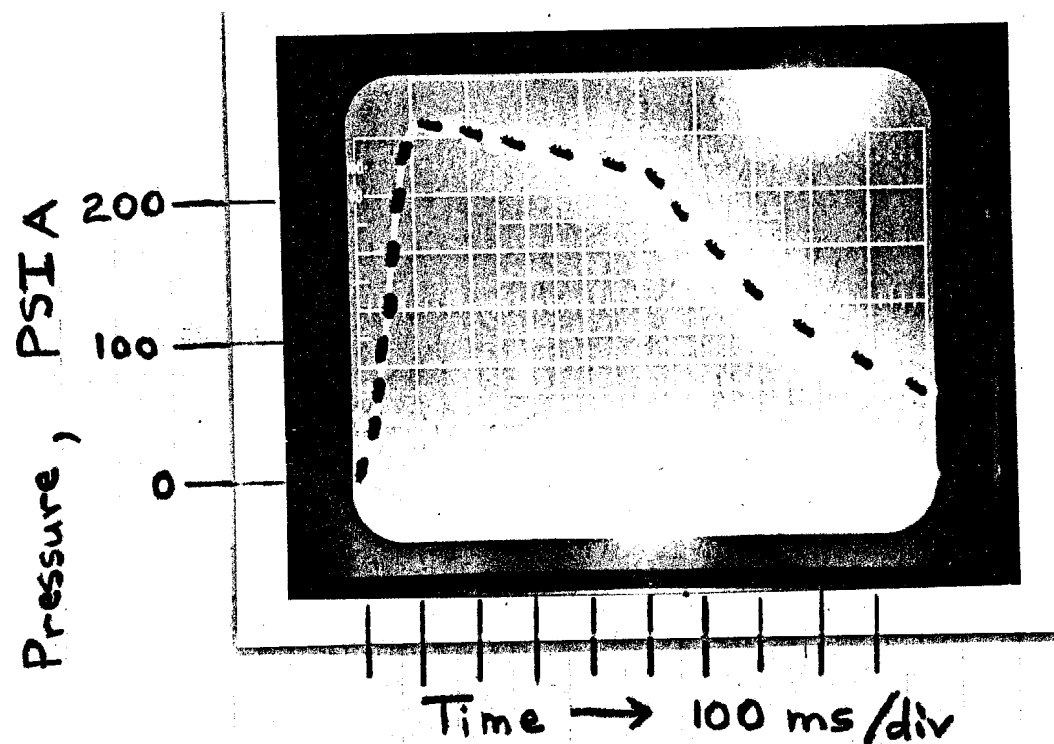


Figure 3.  
Pressure Pulse Trace  
for 100 Pulse Tests

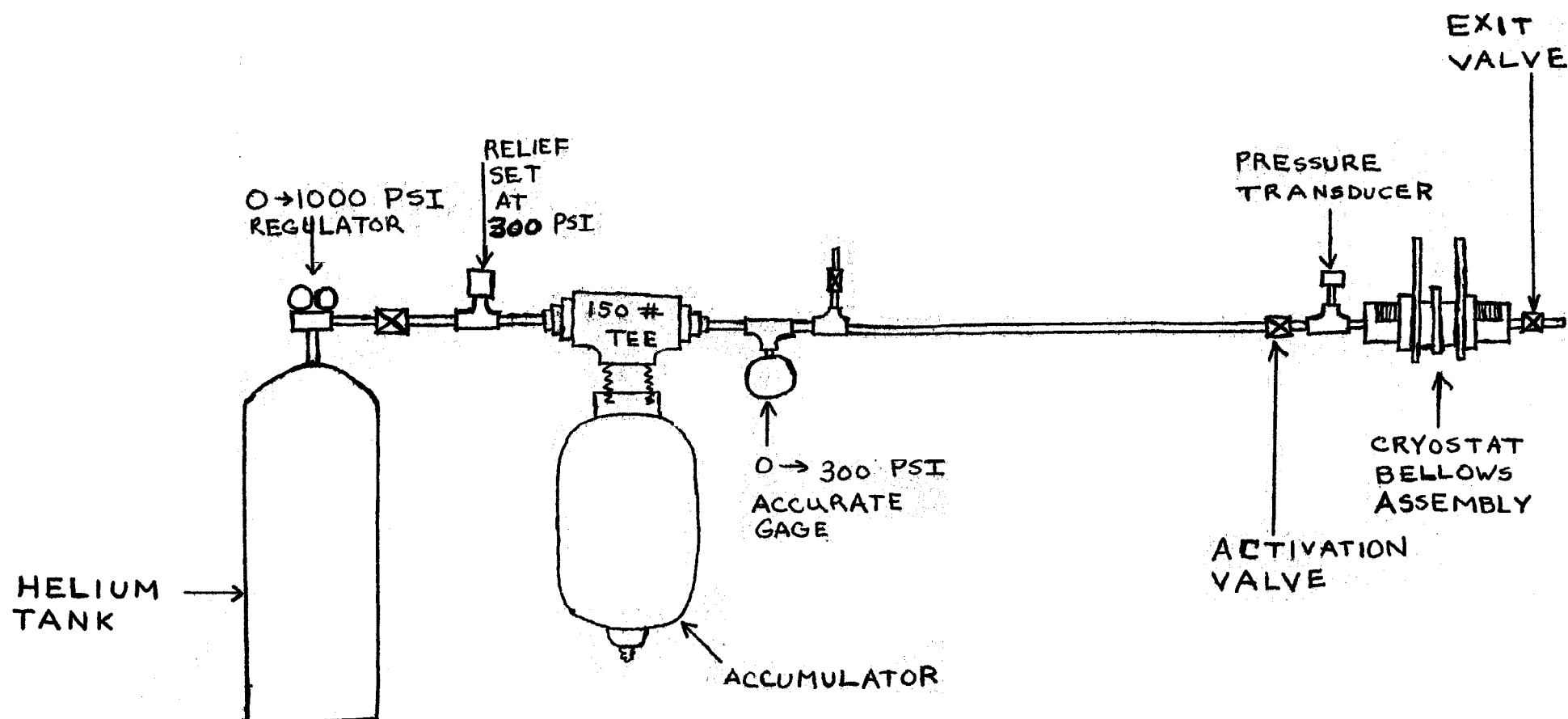


FIGURE 4. TEST APPARATUS

# Pressure Pulse Testing of Saver Single - Phase Bellows

## Video Tape Record

Date	Test #	Attempted		Film Sign	Record No.		notes
		Peak	Pressure		Movie		
7/14/81	1	125	Psia	17	47		
	2	150	Psia	86	94		
	3	175	Psia	114	169		
	4	200	Psia	174	185		
7/22/81	1	225	Psia	200	203		no trigger
	2	225	Psia	214	227		
	3	250	Psia	238	248		
	4	275	Psia	254	280		